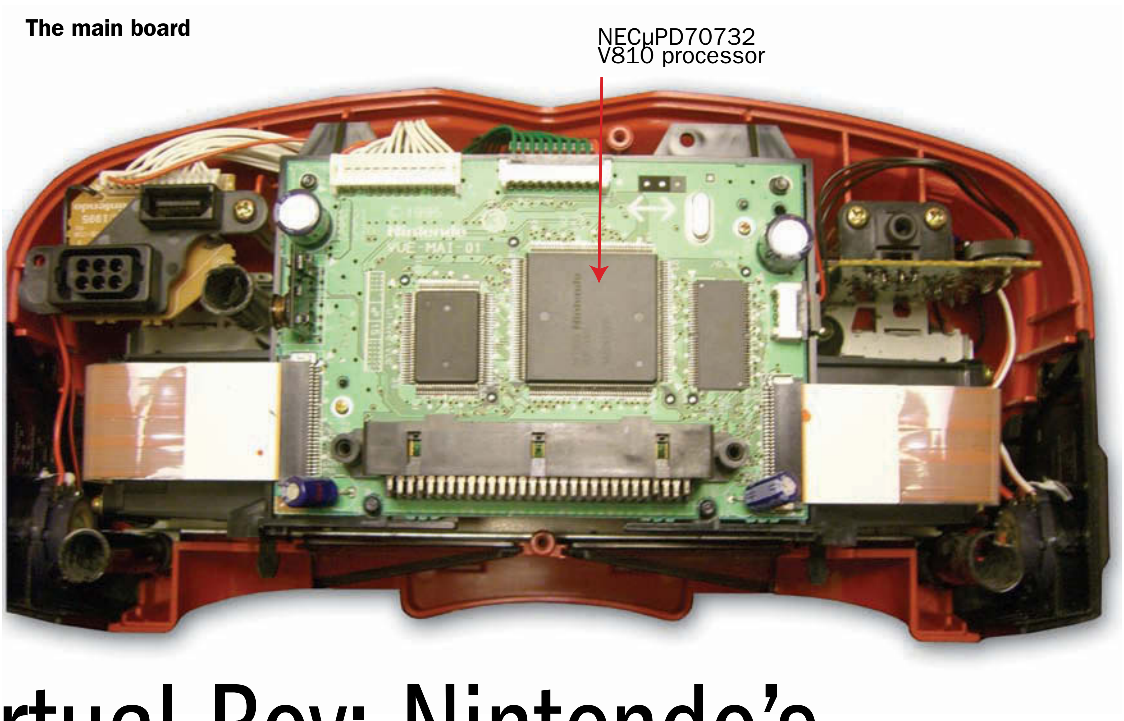


The main board

Virtual Boy: Nintendo's (red and) black sheep

BY ALLAN YOGASINGAM

Released in 1995 in both Japan and North America, the Virtual Boy was to be Nintendo's most daring innovation in portable gaming. The concept behind the Virtual Boy was the promise of "true 3-D graphics" that would whisk gamers away to virtual worlds and provide an experience that no video game console had yet been able to provide. When all was said and done, however, the Nintendo Virtual Boy stands as a footnote in Nintendo's history and the black sheep of its console family.

The history

In the early 1990s, Gunpei Yokoi was heralded in the world of portable gaming for his involvement in the development of the spectacularly successful Game Boy, and in the eyes of Nintendo's executive team he could do no wrong. Nintendo, looking to strike again while the iron was hot, tasked Yokoi with the VR-32 Project, which sought to expand the fan base for portable game systems by giving the games a virtual-reality, 3-D look.

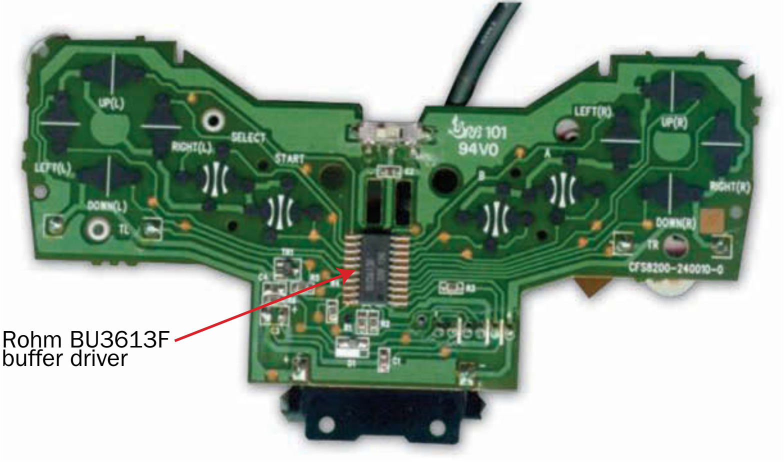
Development began in 1991, with Yokoi's team of 60 designers partnering with optical equipment design specialists from Reflection Technology. As word leaked of the VR-32 Project, anticipation among Nintendo's fans rapidly grew to a fever pitch—so much so that Nintendo management began pressuring Yokoi to complete development ahead of schedule.

It should thus come as no surprise that when the Virtual Boy was unveiled to the public at the Shoshinkai Exhibition in 1994, reviewers and fans were disappointed. The games showcased with the system were unspectacular in their graphics, and the monochromatic system featured only one color (red) against a black backdrop.

Regardless, Nintendo released the system in Japan in July 1995 and in North America a month later. But gaming aficionados found the Virtual Boy's technology lacking and its catalog of games underwhelming compared with the titles available for the Game Boy.

In the end, Nintendo only shipped 800,000 units; some sales estimates put the figure as low as 770,000 units. Nintendo quietly discontinued the system after about a year, and Yokoi unfairly bore the brunt of the blame for the disastrous run.

Controller



Rohm BU3613F buffer driver

Inside the Virtual Boy

Encased with the red unit were two LED displays that were developed by Reflection Technology. The high-resolution displays were in actuality two 1 x 224 linear arrays (one for each eye) that scanned the array across each eye's field of view using a set of flat oscillating mirrors. The mirrors vibrated rapidly so as to provide the layered 3-D look seen through the eyepiece.

The Virtual Boy was considered monochromatic because it relied solely on high-performance red LED light. (The option to build a full-color unit was never fully explored by the development team, partly because high-efficiency, high-performance LEDs in green and blue were not to the satisfaction of Yokoi and his designers. The addition of blue and green LEDs would also have increased the price of manufacture to a level Nintendo was unprepared to absorb.) The display was controlled via a pc board located near the top of the system.

The Virtual Boy was powered by an NEC V810 processor, labeled on the main pc board as the μPD70732. The μPD70732 was the first microprocessor in NEC's V810 family for embedded control applications. The 120-pin QFP-packaged circuit used a 32-bit RISC architecture that featured high-speed real-time response, high-speed integer operation instruction and floating-point operation instruction. The μPD70732 also featured a 32-bit separate address/data bus, 1-kbyte cache memory, 16-bit fixed instructions and 32-bit general-purpose registers.

Other devices of note on the Nintendo system's main board included:

- Toshiba's TC511664BJ-80, a 40-pin, SOJ-packaged, 1-Mbit DRAM;
- Sharp's LH5P1632N-70Y, a 40-pin SOJ-packaged, 512-kbit pseudo-static RAM; and
- Texas Instruments' 57AOY5K, a 14-pin hex inverter.

A look at the memory devices' data sheets reveals just how dated the parts were: Both data sheets note that the memories were manufactured using "cutting edge" silicon-gate CMOS technology.

Series of missteps

There are myriad reasons the Virtual Boy failed to resonate with a fan base that had grown to love all things Nintendo.

Remember that Nintendo faced very little competition in the portable gaming market in 1995. Sega's Game Gear (released in 1992) and NEC's TurboExpress (released in 1990) held a small percentage of the market, accounting for less than 10 percent of overall sales for portable gaming units.

Nintendo was so popular, in fact, that it had managed to build incredible expectations for the Virtual Boy even though it had spent next to nothing in marketing: The mere rumor of a portable system that would offer a virtual-reality experience had Nintendo's many fans salivating at the prospects. And therein lay the problem. Fans' expectations of what the system would deliver (based on Nintendo's sterling record of delivery with previous products) were so high that nothing short of perfection would prove acceptable.

Another reason the Virtual Boy failed was that it was rushed to market. Fans' eagerness, and Nintendo management's subsequent impatience, forced Yokoi's team to release a product that wasn't ready for prime time. Yokoi had grandiose visions of what the Virtual Boy would be, but the product his team released fell far short of the mark.

In combination with the rushed release was a lack of compelling video games that would attract people to the Virtual Boy. Every Nintendo system released always featured a game that was well-developed and challenging, and that showcased the hardware's capabilities. Nintendo had the original Super Mario Brothers and Duck Hunt; the Game Boy had Tetris; Super Nintendo had Super Mario World. The Virtual Boy's initial lineup offered the forgettable Mario's Tennis, Red Alarm, TeleroBoxer and Galactic Pinball. Only TeleroBoxer offered a passable 3-D experience. Only 22 games were ever released for the Virtual Boy, and only 14 of those made it to North America.

A final blow to the Virtual Boy came when some users complained they had suffered bouts of nausea after extended sessions of play. The red LED display and the movement of images in the background of the games (to simulate 3-D) gave some gamers motion sickness. The revelation was a further indication that the system had been rushed through development, since proper market testing would have uncovered the Virtual Boy's effect on some players.

To Nintendo's credit, the company bounced back quickly from the fiasco. It also learned from the experience that proper R&D and testing take time but are worth the wait for companies and customers alike.

Nintendo's brass also wisely did not sour on the idea that innovation is worth the risk. Nintendo's continued willingness to stretch the envelope eventually led to the development of the Wii.

And we all know how successful that little gambit has been. ■

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